ADDIS ABABA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

RELATIONSHIP BETWEEN HOUSEHOLD INCOME AND FERTILITY IN ADDIS ABABA: THE CASE OF ADDIS KETEMA SUBCITY WEREDA 4 AND 10

BY: MOHAMMEDNUR AHMED

September, 2021

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BY: MOHAMMEDNUR AHMED

ADVISOR: PROFFESSOR ESHETU GURUMU

A THESIS SUBMITTED TO COLLEGE OF DEVELOPMENT STUDIES, CENTER FOR POPULATION STUDIES IN PARTIAL FULFILMENT OF THE REQUIRMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN POPULATION STUDIES (REPRODUCTIVE HEALTH)

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This is to certify that the thesis prepared by Mohammednur Ahmed entitled: ***"Relationship between* Household Income and Fertility in Addis Ababa: The Case of Addis Ketema Sub-City.** And submitted in partial Fulfillment of the requirements for the degree of Master of Science in population studies (Reproductive Health) complies with the regulations of the university and meets the accepted Standards with respect to the originality and quality.

Signed by the Examining Board

Dr. Teferi

_____ _____ _____

External Examiner (Name) Signature Date

Dr. Chalachew Getahun

_____ _____ _____

Internal Examiner (Name) Signature Date

Professor. Eshetu Gurmu

_____ _____ _____

Advisor (Name) Signature

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Acronyms

CEB	Children ever borne
CI	Confidence Interval
CSA	Central Statistics Agency
EDHS	Ethiopian Demographic and Health Survey
EU	European Union
GIS	Geographic Information System
SPSS	Statistical Package for Social Sciences
TFR	Total Fertility Rate
UN	United Nations
USA	United State of America
W HO	World Health Organization
ILO	International Labour Organization

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Abstract

Existing evidences show an inverse relationship between income and fertility among countries, and across households. Although the inverse association is observed quite often, there are conditions under which fertility and income are correlated positively. Many studies find lower fertility among those who earn high income. Nonetheless, it is sometimes argued that early on in the development process, a positive relationship between income and fertility could exist. Most of the studies that document a positive relationship are subsumed in agrarian economies, and often income is peroxide by farm size. This paper explored the relationship between household income and fertility, in cross sectional manner using primary data in Wereda 4 and 10 located in Addis Ketema Sub-City of the City Government of Addis Ababa. The study used Poisson regression model and descriptive statistics. Poisson regression model accounts for the non-negative count variable. A cross-sectional based study was held on 422 randomly selected reproductive age women using primary data which was collected using structured questionnaire through face to face interview. The bivariate findings of the study indicated that the mean children ever borne was 1.92 which below the replacement level. On the other hand, to assess the effect of household income on children ever borne, the Poisson regression model was fitted and significant determinant of children ever born he multiple Poisson regression result shows that Household Yearly income was significant predictor on the mean children ever borne (b= -0.019 S.E=0.005 Sig =.027 with weld confidence interval 95%) and the incidence rate ratio (found in EX (B) column) is 0.935 which indicates that household income was negative and significant determinant for the incident rate of children ever borne . Furthermore, marital status, educational level, age group, age at first marriage and occupation are significant determinant of children ever borne, while religion is not significant determinant.

Keywords: Household yearly income, children ever born and Fertility

CHAPTER ONE

INTRODUCTION

1.1 Background

There are different component of population dynamics that plays a major role in changing the size and structure of the population over time, among them fertility is the major component. Ethiopia, like most countries in sub-Saharan Africa, is characterized by rapid population growth, which is influenced by a high level of fertility (United Nations, 2019). A fertility rate is a measure of the mean number of children a woman would have during her childbearing years. The fertility trends are different between countries and over time. The world's total fertility is projected to decline to 2.4 children per woman by 2030 and 2.2 children per woman by 2050 (WHO UNICEF UNFPA, 2014). In Africa, fertility is expected to decline to 3.9 children per woman by 2030 and 3.1 children per woman by 2050 (WHO UNICEF UNFPA, 2014). Ethiopia has high fertility when we compared with the world and African standard. This is because of Ethiopia had Total Fertility Rate (TFR) of about 5.2 in 1960, 6.6 in 1990, 7.7 in 1993, 5.5 in 2000, 5.4 in 2005, 4.8 in 2011and 4.6 in 2016 (Teller and Assefa, 2011; CSA and ICF International, 2012; Office of Prime Minister, 1993; CSA and ICF, 2017). In addition, Ethiopia`s TFR is estimated to reach 3.99 in 2020, 3.11 in 2030, 2.28 in 2050 and 1.79 in 2100 in the medium variant projection (UN, 2015). Population change, basically affected by fertility, is also a concern for policy makers, planners and programmers (Population Reference Bureau, 2009). In recent year, the growth of the developing world population has remarkably fast-forwarded that of high-income countries. The highest growth rate of population as a result of high fertility rate is almost entirely concentrated in the third world countries ; on the other hand , the smallest rates of population growth is observed in the developed countries (Population Reference Bureau, 2009). Among the different continent, Africa has the highest rate of fertility and the largest percentage of population growth. The number of elders in Africa is very small when we compare with young population which is very large number of the population in Africa is (Population Reference Bureau, 2009).

The association between income and fertility is an important topic in demography. If a rise in family income is leads to the rise within the value of women's time, this source of income not only expands income opportunities of the family but also raises the effective price of youngsters to the family. As a result of it's empirically observed that higher values of women's time are related with lower levels of lifetime fertility, it's inferred that the price effect of women's wages outweighs its income effect on fertility. In contrast, if an increment in total family income is leads to a rise within the returns to physical asset, financial assets, business assets, land, and natural resources, such as oil, these income sources increase family endowments while not necessarily affecting the relative cost of youngsters to oldsters, during which case these income sources are expected to be associated with higher fertility, other thing remain an change (Schultz 1981, 1994).

Fertility is usually higher in poorer families within a society, and across countries that have quite average fertility and lower average income (Schultz, 2005). Because of high level of actual fertility in sub-Saharan Africa, it was found out that unrealized fertility rate among women at the end of their reproductive careers is higher than other regions. (Casterline and Han, 2017). The wish for more children will be strong only when children are economically, socially and mentally valuable (Teller and Assefa, 2011). Currently mortality is decreasing, due to this studying fertility, in the current situation, is very important to resolve the problem of rapid population growth leading to rising demand for economic resources in developing countries (Khan and Bari, 2014).

The purpose of this study is to assess the effect of household income on fertility rate in Addis Ababa. The relationship between household income and fertility will be examined using the Poisson regression model and Descriptive statics in Wereda 4 and 10 residents of Addis Ketema Sub-City in Addis Ababa. The study location is selected since the area is dominated by the poorest and recent migrants of city residents who engage in economic activities that demand much household labor (Ketema, 2011), and parents are less likely to afford investing in offspring and tradeoff the quality versus quantity of children.

1.2 Statement of the Problem

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Fertility in sub-Saharan Africa is twice higher than the replacement level which was 4.6 births per woman though it was 2.5 in South Africa (equal to the world total fertility rate) in 2016 (Population Reference Bureau, 2016). Even today , fertility is still highly valued in sub Saharan Africa (Sennottand Yeatman, 2012).The reason for higher level of fertility in Ethiopia and the rest African countries is because of high demand for youngsters in agricultural activities , domestic household chore, adulthood security and replacement against anticipated death (Deneke, 2015; Wubegzier and Alemayehu, 2011; Ojakaa, 2008). For instance, Deneke (2015) showed that more number of children is needed to support agricultural activities in rural areas besides involving in fetching water and collecting fire wood.

Women's increasing education, access to new family-planning technologies, and accumulation of work experience outside home has increased the share of women's earnings in total family income. Researchers suggest that this redistribution of economic power (from men) to women is related to a reallocation of family expenditures toward children, while helping women with dependent children to head their own households if necessary, and further strengthening women's incentives to have fewer children over their lifetime because they expect to bear more of the cost of rearing children (Becker 1981; Schultz 2001). During the course of development, income changes directly with other economic, social and demographic variables and, therefore, its effect on fertility can hardly be isolated from the effects of the other variables. Nevertheless, many researchers have tried to figure out the relation between this variable and fertility. Some investigators have concentrated on studying the changes in the income-fertility relation over different stages of development. Other have aimed at measuring the relative effect of income on fertility, along with other socioeconomic variables (Acsadi 1984). In addition, there are different arguments related to the relationship between income and fertility. It is sometimes argued that at the earlier state go the development process, a direct relationship between income and fertility could exist. Most of the studies that document such a direct relationship are set in agrarian economies, and often income is peroxide by farm size. For example Simon (1977, chapter 16), documented an immediate (positive) relationship between farm size in hectares and therefore the mean numbers of CEB for rural areas in Poland in 1948, while Clark and Hamilton (2006), reported a positive relationship between working status and the number of surviving children in

England with in the late 16th and early 17th century (Clark 2005; Clark; 2007). Weir (1995) in parallel found a weak direct relationship between economic status and fertility in the 18th century France, in addition Wrigley (1961) and Haines (1976) documented higher fertility in the coalmining areas of France and Prussia than in surrounding agricultural areas during the top of the 19th century. Furthermore, Lee (1987) documented a similar finding using data from the U.S. and Canada survey. This body of work reported that the fundamental forces affecting the demand for children might be different in areas in which agriculture is the primary economic activity; that means , a household chore that demand much labour.

Due to low reproduction capability fertility appears to be higher among wealthier households and general higher rates of infertility among the poor (Lipton 1998; Livi-Bacci and di Santis 1998). Similar to , a number of studies were held using cross-sectional data, the association between family income and fertility had shown to be either flat or declining and to many observers, these observations reported that the taste for children had waned over time and that lower -income earner families placed high value on childbearing than the higher income earner ((Doepke 2014).). Those with higher mean fertility tend to have lower average income. Building on ideas from Becker's "Theory of Social Interactions" (Becker 1974), Becker and Tomes (1976) extend the Becker-Lewis model by allowing child quality to depend not just on parental inputs, but also on "endowments," which can take the form of inherited ability, public investments in children, and other factors. As reported by (Beker and Thomas, 1976), one effect of the presence of endowments is that the income elasticity of child quality tends to be higher at low-income levels, because for low-income parents the endowment represents a larger fraction of total child quality. In addition, Becker and Tomes also show that this characteristic can generate a U-shape relationship between income and fertility, even if the income elasticities with respect to child quantity and total child quality (the sum of endowment and parental investment) are equal and constant. They also discuss the predictions of the theory when child endowments depend on parental income, and when the impact of economic growth on fertility is considered.

According to Easterlin's in His relative income theory, He explains that the factors that influence marriage and fertility are the potential earning power of pair, their material desires and their socialization experience. When relative income increases, there will be less economic pressure on the couple and therefore they will not feel restricted to marry and have children. The couple's relative income is that the ratio of their earnings potential to their material aspirations. However,

these factors are difficult to obtain. Therefore, relative income can be nearly obtained by the ratio of recent income of the male to the past income of the male's parents. This approximation is resulted from past income of the male's parents represents the environment during which he was raised, and thus may be a good measure ton indicate the level of the couple's material aspirations (Richard Easterlin, 1987*).*

Indention, to the above study conducted in US on an Economic History of Fertility, documented an inverse cross-sectional relationship between income and fertility in the United States and find that the relationship has been stable over time. In particular, the paper shows an inverse relationship for 30 birth cohorts between 1830 and 1960, with the income elasticity of fertility unchanged roughly constant at about -0.30. On the other hand, a study was conducted in Europe, which in titled as is a Positive Relationship between Fertility and Economic Development Emerging at the Sub- National Regional Level? Overall, the trends of these cross-sectional relations provide that over the last two decades most European countries have experienced a lessening of the negative association between economic development and fertility across their regions. But in many countries, this association has even turned positive. Despite that, the fertility and economic levels at which countries report such tendencies vary substantially across countries (Jonathan Fox, 2018).

Simultaneously, a study conducted in Africa, by Van der Vleuten & Kok (2014), The Fertility Transition: Panel Evidence from Sub-Saharan Africa. The fertility rates in the Sub Saharan Africa region have remained high until recently and this is shown by the average fertility rate in the region which measures at 5.9 children per woman. Interestingly, once we check out the statistics intimately, we noted that the richer economies, like Botswana, Mauritius, Seychelles (with the very best recorded income per capita at $13,889.95) and South Africa, are also characterized by lower fertility rates (Mauritius at 1.43 children per woman). The opposite holds true for the poorer countries. The DRC, Liberia, Niger and Rwanda are a number of the poorer economies within the region (Liberia recorded rock bottom income per capita at $50.04). They are characterized by high fertility rates (Rwanda at 8.4 children per woman). Likewise, a study was conducted in Addis Ababa, Ethiopia about Fertility Decline Driven by Poverty documented that; despite controlling for marital status, and the other relevant covariates, each raise in income category causes important and significant increase in the risk of giving birth to a first child. Even

among ever-married women only, the relative yearly risk of birth was highest among those earning better incomes. Ever-married women with no reported income and lower income (i.e. less than 250 birr a month) were found possess an especially reduced risk of giving birth to a first child (Gurmu and Mace. 2013). Previous research has looked at factors affect women fertility from different angles bot not the direct relationship between house hold income and fertility. None of the above research specifically uncovers or asses the relation between house hold income and fertility specifically therefore the researcher attempted to answer the contribution relationship between house hold income and fertility. In addition most of the studies used secondary data and there were controversy among the different researchers on the relationship between household income and fertility (i.e some of the researcher suggests negative relation and others suggests positive relation) so this is the gap in the previous justified for this study to be conducted. For this reason, this paper assesses the relationship between household income and fertility using primary data and this study will provide current information on the relationship between the variables using Descriptive statistics and Poisson regression models in Wereda 4 and 10 residents of Addis Ketema Sub-City in Addis Ababa.

1.3 Objective of the Study

1.3.1. General Objective

The general objective of the study is to assess the effect of household income on fertility in

central Addis Ababa, Addis Ketema Sub-City Wereda 4 and 10.

1.3.1.1. Specific Objectives

1. Describe the study population in terms of their income and fertility characteristics
2. Examine the relationship between income and fertility.

1.4 Significance of the Study

This study is important for researchers, planners and policy makers and as it addresses the effect of household income on fertility in Addis Ababa. Results of the study are believed to help designing appropriate policies and strategies to enhance the involvement on women in education, working activities (private or government and NGO) to raise their income. In addition, it gives pathways to make better harmony of the nexus between population and development from the perspectives of income generating activities and setting a baseline for successful implementation of the existing policies, plans and programs. Researchers can also make use of the findings of this study to undertake further research to fill in the gaps on factors affecting fertility. Far beyond this, conducting the study in Addis Ababa City is believed to cover different groups of population as the city is the home for diversified residents.

1.5 Scope and Limitations of the Study

The scope of this study is delimited to the reproductive age women in Woreda 4 and 10 of Addis Ketema Sub-city to assess the relationship between household income and fertility.

The study is not without limitations and these should be kept in mind when these results are interpreted. Among those limitations in this study is, its focusing on only two Woredas out of the total weredas in Addis Ababa is clearly insufficient to draw international or regional level conclusions, and those drawn here are only about the case study area. The relevant population from which the sample was derived was the population of the two weredas in Addis Ketema rather than the urban reproductive women population as a whole. In addition as members of our society do not have the culture of documenting their income and consumption expenditure; it is not easy to gather information on household income.

1.6 Organization of the study

The research report was organized in five chapters. Introduction, statement of the problem, significant of the study and objectives was described in chapter one. Chapter two studies and assesses review of related literature. Chapter three deals on research design and the methodology used for the study. Chapter four comes next and states the result of the study and also discussion of the result. Finally, summary of the result, conclusion and recommendation of the study are presented in chapter five. List of reference materials for conducting the study are annexed at the end.

CHAPTER TWO: LITERATURE REVIEW

2.1 Conceptual Review

2.1.1 Overview of Household income and Fertility

Fertility is the actual reproductive performance of an individual or a couple or a group, or a population. We can measure fertility by using Children Ever Born and Total Fertility Rate. Total Fertility Rate refers to the mean number of children a woman would have by the end of her childbearing years if she born children at the current age specific fertility rates (CSA, 2016). Based on to United Nation (UN) definition CEB to women in a particular age group is the mean number of children born alive to women in that age group. The difference in fertility among different nations is, mainly due to differences in economic, cultural, and health factors which interfere with the process of human reproduction (Teklu, Sebhatu, & Gebreselassie 2013). The socio economic factors like the cost of children, women education, women working status , economic growth and the sociocultural factors like family formation, timing of child birth, value given to children affect fertility (Hoorens, et al., 2011).

On the other hand, Household income, as defined by the U.S. Census Bureau, includes the gross cash income of all people ages 15 years or older occupying the same housing unit, regardless of how they are related, if at all. A single person occupying a dwelling alone also is considered a household. To calculate the household income for a single home, total the gross income of each person living in the home who is 15 years old or older, regardless of whether they are related or not. Household income is usually calculated as a gross amount rather than net figure, before deducting taxes or withholdings. In addition, based on the Twelfth International Conference of Labour Statisticians, Household income is derived from the following main sources: employees' salaries, wages and other related receipts from employers, net income from self-employment, business profits, and income from personal investments (rent, interest, and dividends), royalties and commissions.

For purpose of household survey it is convenient to include as income the periodic payment receivedregularlyfromaninheritanceortrustfund,alimony,pensions,annuities,scholarships,remittan

ces and othercashassistanceregularlyreceived,andvariousotherperiodicreceipts,togetherwithsocial security and assimilated benefits in cash and in kind(ICLS, 1973).

2.2 Relationship between Income and Fertility

There has been observed a strong negative relationship between income and fertility. In general, poor countries tend to have higher levels of fertility than rich countries. This decreasing relationship between fertility and income is well known to economists and demographers. In addition, it holds true over time: High income countries, like the U.S., have experienced declines in their fertility rate as their level of income grew. The relationship has been observed at the individual level with rich families tending to have fewer children than poor families (Vandenbroucke, 2016).

Fertility would decline with income because rising income is correlated and increases with other characteristics, like education, urbanization, and attachment to the labor force (Price, 2013). Time is relatively cheap in poor countries, so spending time away from work to take care of a child is not as costly as in a rich country. If this effect is strong enough, it can (and probably does) offset the fact that it is difficult to afford a child on a low income (Vandenbroucke, 2016). Higher income also increases financial security and children are seen as less necessary to take care of their parents in old age. However if the other factors are remain unchanged and only income increases then fertility also increases concurrently (Price, 2013).

2.2 Theoretical reviews

As a result of the complicated nature of human fertility, it is usually very difficult to establish a coherent relationship between the factors that affect fertility negatively and positively. Among the scholars: Freedman (1967), Easterlin (1975), the World Fertility Survey (1984), Bongaarts (1978 and 1983) with other researchers , have tried over the years to have a very integrative, comprehensive, logical and consistent theoretical and conceptual on fertility.

Among the various theories of fertility decline, "the Demographic Transition Theory" (Kirk, 1996) and the "Neo-classical Micro Economic Theory" (Becker and Lewis, 1973), these are considered to be the most useful. They relate high fertility with low level achievement of economic development. They gave focus on the most important contributing factors to the high levels of fertility in sub-Saharan Africa results from the low level of economic development. High infant and child mortality, low levels of contraceptive use, and the relatively low social, educational and employment of women are contributing to the high fertility norm are Their manifestations.

2.2.1 Quantity-Quality Theory

The demand for child quality naturally leads richer parents to want more quality and thus less quantity, what is sometimes called the quantity-quality tradeoff -hypothesis. This idea seems to not be a really robust theory of the negative fertility-income hypothesis. Numerous studies are dedicated to examine the connection between child quality and quantity beginning the seminal work of Becker and Lewis (1973). Studies held by (Rosenzweig and Wolpin1980; Hanushek1992; Parish and Willis1993) mostly support Becker and Lewis's quality–quantity (Q-Q) trade-off theory, recent studies are less conclusive. Conley and Glauber (2006) find that children with more siblings (one of two or more individuals having one common parent) are less likely to attend private schools. Li et al. (2008) and Rosenzweig and Zhang (2009) show that family size features a negative effect on children's education, particularly in areas with poor public education systems. However, Angrist and colleagues (2010 do not find any negative consequences of having more siblings. Black et al. (2005), reported that family size has a small effect on child quality, once controlling for the birth order effect. The declining quantity of youngsters will release resources for human capital investment; on the opposite hand, larger

family size may enjoy the economies of scale and therefore the social interaction of children. Based on the argument of Black et al. (2005), children with fewer individuals having one common parents may not be better off than if they are in a larger family. On the other side, if the Q-Q trade-off exists, it reported that oldsters who have fewer children allocate more of their time and resources to each of the kids assuming that oldsters invest in children evenly and holding income constant.

2.2.2 Demand for Children

There are different scholars who deal with the need of children, among these: Gary Becker (1960) introduced the first approach to the economics of population through a simple model where children are treated as a normal good, and the demand for them is increasing with income. Beginning from this, many scholars have contributed to a large debate. While neoclassical economists have attempted to explain fertility through microeconomic models, for instance, the quantity-quality approach (Becker, 1981) or the value of time (Mincer, 1963), higher wage families face a higher price of children, when the only cost of children is time, and if that time is the parents time. This induces the usual wealth and substitution effects that are familiar with the main ideas of the demand theory. Surely, it shows that compensated demand for children is decreasing. This is not sufficient, but, to automatically imply that the demand for children is decreasing in income, since those families that face higher prices also have more wealth. Thus, it depends on which of the two forces is stronger depends (Jonen, 2008). On the contrary, others argue that although each birth is a unique and individual act, fertility is a social behavior and, therefore, sociological and anthropological approaches should be used to explain it (Lesthaeghe and Surkyn, 1988, Caldwell, 1982).

Give more focus on the demand for children as the key to understanding fertility behavior is standard formulation of the microeconomic theory of fertility. It also treats, but less fully and systematically, the prices of controlling fertility. The principal innovation in the present approach, which builds substantially on prior work by Tabbarah (1971) and Wachter (1972), is more explicit and formal treatment of the production of children, including the likelihood of shifts in output independent of demand conditions. Giving emphasis to the assembly side results

in greater recognition of such sociological concepts as natural fertility and of real-world conditions to which the standard demand analysis could also be inapplicable.

2.2.3 Microeconomic models of fertility behavior

There are different scholars who explain the microeconomic models of fertility. One of these is Becker (1981) who, in his economic treatise on the family, assigns a central role to market/non-market specialization of partner in the household, with childbearing and rearing being the dominant non-market production activity traditionally performed by women. To place more structure on fertility choices, Becker (1960; 1981) and Willis (1973) hypothesize that parents viewed the human capital of their children (child quality) as a substitute for their number of children (child quantity). If this were the condition, then by definition income compensated cross-price effects should be positive between child quantity and quality. In other words, increasing the worth of youngsters , for instance by reducing the value of contraception , would directly decrease fertility and indirectly increase the demand for child quality (with income held constant). Conversely, increasing the wage returns to schooling within the labour market would directly increase the demand for schooling and indirectly decrease the demand for births. Becker and Lewis (1974) postulate further that the income elasticity of demand for child quality exceeded the positive income elasticity for child quantity, which could account for the paradoxical decline in fertility with growth in income, without having to assume that children (quantity) are an 'inferior' good that income effects are negative, or to means increases in women's value of their time within the fashionable economy caused the decline in their fertility.

In high income countries fertility were decline by half during the 20th century (Schultz, 2007) brought zero population growth in many of these countries whereas, the decline in fertility by more than half in low-income countries in 40 years (1965–2005) is not yet comprehensively accounted for, although demographers are agreed that these trends in fertility are irreversible and the size of the world's population will stabilize later in the 21st century.

2.2 Empirical reviews

There is a large demographic literature that tries to show the relationship between income and fertility; there is a direct relationship between income and fertility in poorer and historical societies, in particular for surviving children (Lee, 1987; Skirbekk, 2008). On the other hand, with the fertility transition (and deliberate fertility control) an inverse relationship starts to emerge, with high income groups reducing their fertility first (Dribe, Oris, & Pozzi, 2014; Livi-Bacci, 1986). In Sweden in the half of the 20th century this inverse relationship between female labor force participation, and fertility that emerged during the fertility transition, begins to weaken (Sandström & Marklund, 2017). In the 1930s some Swedish authors' opposition a positive income and fertility association with a negative pattern found elsewhere in developed countries (Edin & Hutchinson, 1935). Bernhardt (1972) examined the relationship between fertility and income among Swedish married couples with fertility and income measured in the 1960s and found no strong gradient for entry to parenthood, a slight positive gradient for having a second child, and a negative gradient for higher order births. Generally, this translated to a slight negative gradient. But, couples in the highest income groups also had a large number of children. There is strong support for a direct association between positive economic cycles and fertility historically, typically based on how average salaries and grain prices have affected fertility prices (e.g. Galloway, 1988 Bengtsson, Campbell, & Lee, 2003; Lee & Anderson, 2002). There is also increasing evidence of macro-level pro-cyclical fertility in developed (richer) countries (e.g Sobotka, Skirbekk and Philipov 2011). Over all of the 20th century there appears to be a broad cross-sectional inverse correlation between observed individual level income and fertility in most societies (Jones and Tertilt 2008, Skirbekk 2008).

There is also a strong invers correlation between income and fertility. Economists sand demographers have knowledge on negative relationship between fertility and income (Price, 2013). In addition, the developed nation experienced declining fertility as their income raised for instance United State of America (Price 2013). The relationship has been observed at the individual level with poor families tending to have more children than rich families (Vandenbroucke, 2016). Families in The poor countries have enough time to care their child than the rich countries, so spending time away from work to take care of a child is not costly and the opposite is true rich country. If this effect is good enough for, it can offset the fact that it is difficult to afford a child on a low income (Vandenbroucke, 2016). Higher income also

increases financial security and children are seen as less necessary to take care of their parents in old age. However, holding other factor remains unchanged as income increases then fertility also increases concurrently (Price, 2013). A similar relationship also appears when comparing societies cross-sectional, based on level of development (Thornton, 2005). Studies from the US over the last 40 years gives mixed evidence for male and female income using a variety of identification strategies and theoretical models (e.g., Becker & Lewis, 1974; Borg, 1989; Freedman & Thornton, 1982; Schaller, 2016), though overall broad associations appear to be consistently robustly inverse (Jones & Tertilt, 2008). There is recent evidence of direct income-fertility associations in Scandinavia when current income is compared with following fertility decisions, especially for men (Gunnar Andersson, 2000; G. Andersson & Scott, 2008; Duvander & Andersson, 2003; Jalovaara & Miettinen, 2013).

Recently there is also some evidence of macro-level direct cross-sectional association between gross domestic product and fertility at high levels of development (Myrskylä, Kohler, & Billari, 2009). For education, researchers still typically find a negative gradient between longer education and fertility (e.g., Preston & Hartnett, 2010; Skirbekk, 2008), but also that is changing in Scandinavia in recent cohorts (Jalovaara et al., 2017). According to Becker (1960),the number children increases as the income of the household increases, all things remain unchanged. This was later changed to an assumption that the expenditure on children increases as income increases, but that parents react to income increases mainly by investing more in each child (Becker and Lewis 1974). Fertility usually varies directly with income and the economic contribution of children, ceteris pari-bus, and inversely with the opportunity costs of children (Robert Rapetto, 1973).

Becker (1960) proposed that the cost of rearing children increased over time, as a result this leads to decline in parents' demand for children. Mincer (1963) hypothesized that a rise in women's wages increased a couple's cost of getting children, raising the shadow price of youngsters . He argued that the increase in female labour-force participation and therefore the decline in fertility were both caused by conditions increasing women's wages relative to other consumer prices and men's wages. In economics the concept of accumulated life course income is almost equally related to the concept of permanent income (Friedman, 1957). It plays an enormous role in theoretical economics but is usually operationalized as future expected income,

which is postulated from present traits (such as sex, educational level, parental background or occupation in early adulthood). It is only very rarely assessed or validated with retrospective empirical data.

Richard Easterlin (1969) also made a strong case for the price of permanent income in studying the correlation between income and fertility. Even though, this call has not been answered in empirical research. One study (Ewer & Crimmins-Gardner, 1978) has made a serious attempt to sort out how different current income relates to life course income and how this affects the income and fertility relationship. They examine current income, expected income, and income trajectories, and located that counting on current income was a deeply problematic measure for assessing the connection between life course income and fertility. Freedman and Thornton (1982) to some extent also tried to compare current and expected income in their assessment of the relationship between income and fertility.

Some authors (Bollen, Glanville, & Stecklov, 2007) suggested that expected income is a better measure than actual income. While some logic to the argument, in that expectation might be closer related to decisions, it is still problematic. In their views, expected income will be inferred and guessed, and this is almost universally done in speculative manners. Typically, this is done with some imputation technique with a large amount of assumptions based on, for example, current educational achievement (Bollen, Glanville, & Stecklov, 2007). They will, by necessity, capture typical and average trajectories, and not the messy income trajectories observed in empirical populations. Such techniques will ignore the role of volatility, which empirical measurements elegantly capture. For various stratification processes also on understand the theoretical relationship between income and fertility during a society a perspective supported actual income and fertility associations is also clearly superior.

A study conducted in Europe on cross-sectional relationship between income and fertility levels across countries between 1990 and 2012, documented that, in the early 1990s the relationship was inverse for almost all displayed Western European countries within the north and west. The only exceptions were France and Belgium. For Finland, the cross-sectional relation remained consistently indirect throughout the study period, and have become slightly more negative

within the most up-to-date years. However, aside from Finland, France and therefore the UK showed a more indirect correlation coefficient in 2012 than within the early 1990s. Among the five countries that experienced increases, Norway and Sweden stand out. Both countries moved from having a relatively inverse correlation to a direct one. However, for Sweden, the correlation declined within the last two years of the amount to a worth slightly below zero. Additionally, although the correlation between income and fertility has remained negative for both Denmark and the Netherlands, these two countries have recently been experiencing movement towards reporting a less negative relationship between per capita income and fertility. The relationship between income and fertility reported out a big change for Germany from high positive to negative correlations (Klu¨sener and Myrskyla, 2018).

On the other hand, according to study conducted in sub-Saharan Africa, showed that the results for income per capita are negative and significant. A ten percent increase in income per capita in the previous period is reflected in the current fertility declines of about one percent. The delay in the effect of income per capita on fertility captures the lag in people's responses to an increase in income. Initially an increase in income per capita has a pure income effect and raises the demand for children, but over time this effect is replaced by a substitution effect for investment in child education as income continues to increase which decreases fertility rates. This transition is typically found in the Post-Malthusian period where income per capita is rising at a faster rate than population growth (Chisadzay and Bittencourtz, 2016). In addition to the above study a study was conducted in developing nations other thing remains equal 1% increase in the female's share of labour force expected result 0.04 declines in the total fertility of a developing nation. Similarly, 100-dollar increase in per capita purchasing power of party gross national income leads to 0.003 percent decrease in total fertility (Dao, 2017).

A study conducted in Kenya on fertility and income also stated that household consumption per adult is significantly directly associated with the ownership of land, and the receipt of agricultural and nonagricultural rents, These three physical asset sources of income, are generally positively associated with fertility in Kenya. A 10% raise in household consumption per adult, arising from these asset sources of income, is associated with an increase in fertility of 0.19 child in 1994 and 0 .17 children in 1997, where the average fertility in the survey samples is about four

children and a 10% increase in household consumption per adult from sources other than the three asset variables is inversely related to fertility, reducing fertility by 0.20 children in 1994 and by 0.18 child in 1997 (Schultz2005).

Another study conducted in South Africa on the effect of education, income and child mortality on fertility also reported that there was inverse relationship between income and fertility which was an income elasticity of demand for youngsters of -0.31 (Dust, 2005). A study held in Addis Ababa also reported that the average fertility of Addis Ababa is below replacement level, the rationale behind fertility regulation in the City has tended towards reducing the number of children in accordance with one's economic status. The poor living in Addis Ababa have developed a general understanding of spending in fewer children in order to get them a better education and enable them to compete in the saturated labour market of the city (Gurmu and Mace, 2013).

CHAPTER THREE

METHODOLOGY

3.1 Study Setting

As the main aim of this study is to show the effect of house hold income on fertility of reproductive age women regardless of marital status, data from a sample of mothers will be collected using survey questionnaire and interview method. This chapter will explain the methods that were used to answer the research questions, design and approach, study population, inclusion and exclusion criteria's, study variables etc. of this study.

Addis Ketema is one of the 11 sub cities in Addis Ababa City Administration. It is situated in the center of Addis Ababa, bounded from south-east by Lideta, from West by Kolfe Keranyo, from North-east by Arada and Gulale sub cities. At present, the sub city is divided into 10 woredas and 28 sub woredas, 84 Sefers and 302 blocks (Addis Ketema Sub-City Administration, 2021).

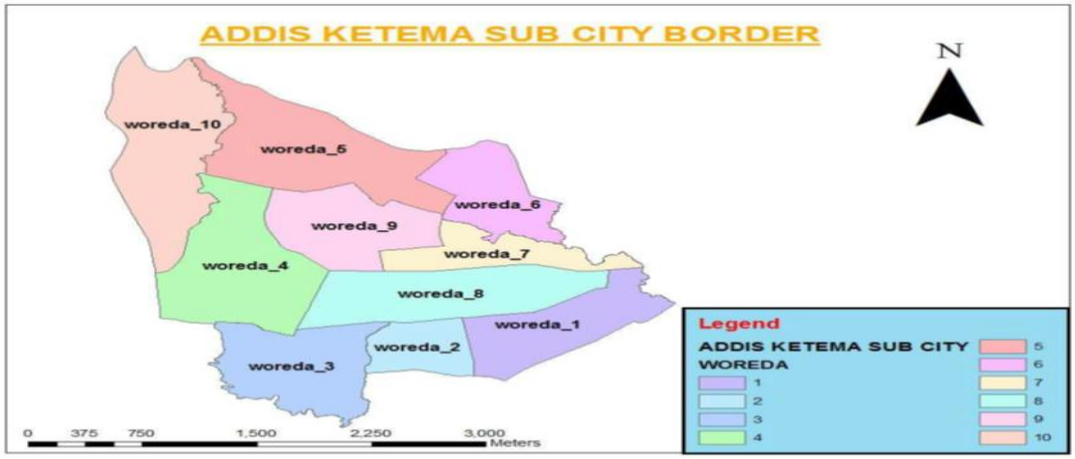


Fig2 1. Map of Addis Ababa City Administration and Addis Ketema Sub-City

(Source: Addis Ababa City Administration Integrated Land Information Center)

This study was conducted in Addis Ketema Sub City of the City Administration of Addis Ababa. The area of the Sub City is 7.41 square Kilometer. It has a total population of 218,187 persons (99,641 males and 118,546 females) in 2017 (CSA, 2016, p. 40) and 80,750 women aged between (15-49). The study area is a highly populated and slum area of Addis Ababa in which the density of population is 37,488.0 persons per square Kilometer. In addition, on average, 4.2 persons per housing unit are dwelling in the area. The majority of the residents work in the Sub City as daily laborer, civil servants or businessmen and businesswomen. Commercial sex workers are also common in the Sub City due to the influx and arrival of more and more people from different parts of the country for various reasons. Regarding the distribution of education in Addis Ketema Sub-city, there are 44 kindergartens out of which 16 belonged to the government and 28 to private and other institutions (Addis Ababa City Education Bureau, 2013)

3.2 Research Approach and Design

The study aims to assess the relationship between house hold income and fertility in central Addis Ababa, Addis Ketema Sub-City Wereda 4, and 10 using primary data which was collected using structured survey questionnaires by face-to-face interview technique. Quantitative research is more concerned with questions about: how much? How many? How often? To what extent? Etc. (Getu and Tegbar, 2006) to investigate this relationship, quantitative research approach is appropriate for the study as quantitative research method deals with quantifying and analyzing variables in order to get results.

Therefore, a household based cross-sectional study design with quantitative method was employed.

3.3 Sampling Techniques and Sample Size

House was elected for inclusion in the survey by systematic random sampling method based on a sampling frame of house numbers developed from sub-cities or wereda and ketena record. The target population were all women (15-49 years old), dwelling in Addis Ketama ,Wereda 4,and 10 Addis Ababa, Ethiopia

3.3.1Inclusion Criteria

- Women in the reproductive age regardless of marital status.
- Women who were voluntary to participate in the study.

3.3.2 Exclusion Criteria

- Women who were not voluntary to participate in the study.
- If the woman is seriously ill.

The primary purpose of sampling is to collect specific cases, events, or actions that can clarify and deepen understanding (Neumann, 2003). There are 11 sub cities in Addis Ababa city administration (even though, we did not get enough information about the new sub city), among them Addis Ketema (wereda 4 (have 4 ketena) and wereda 10 have 5 ketena) are selected using purposive sampling with modal instance sampling (also known as intensity sampling) and the total sample were select using simple random method (to select only for the study weredas) , then the total sample were divided to all those weredas and then to Ketenas proportionally to their population. The households from respective wereda were selected by systematic random sampling method based on a sampling frame of house numbers developed from sub-cities or wereda and ketena record. Individual respondents of women aged between (15- 49) from respective household were selected. If there were more than one eligible woman in the sampled household, one woman was chosen for the interview using a lottery method. If the selected woman was not around or when the household was found closed, the household with the next number on the list was selected and this had continued until the required number of sampled women was acquired.

The total number of people living in the Woreda 4 and 10 at the time of the survey was 22,757; out of which 14076 of them are women in the 15 to 49 Age group. From this population, the required sample size was taken according to the size of the population in each Wereda.

The dependent variable of the study is continuous dependent variable which is children ever born (CEB). Thus, we need to use the following single mean formula to calculate our sample size.

Estimating a sample mean:

$$n = \frac{Z_\alpha^2 \sigma^2}{L^2}$$

$Z_\alpha = 1.96$ where $\alpha = 0.05$ or confidence level $= 0.95$

σ = estimate of standard deviation

L = precisions of the estimate (half the desired confidence interval)

We can use SD values from recent previous studies or make logical guess, in Addis Ababa We did not get estimated standard deviation, as a result we take 0.5

n=384

Final sample size after adding none response =N=384*.1 +384=422

Table3.2 1Schematic presentation of sampling procedure among women by the sampled Woredas

Wereda	No. of Ketena	No. of target population	Representative sample	Percentage out of total
4		10142	303	71.8
10		3934	119	28.2
Total		14076	422	100

3.4 Study Variables

3.4.1. Dependent Variable:

Children ever born (CEB) to women during a specific age group is that the mean number of kids born alive to women therein age group. The number of youngsters ever born to a specific woman may be a measure of her lifetime fertility experience up to the instant at which the information are collected. In most fertility survey this information is obtained through a direct question on total number of live births. Therefore, in these study children ever born is the dependent variable.

3.4.3.2 Independent Variables:

Household income(Y)

Base on international labour force organization Household income consists of all receipts whether monetary or in a similar way (goods and services) that are received by the household or by individual members of the household at annual or more frequent intervals, but excludes windfall gains and other such irregular and typically one-time receipts .Household income receipts are available for current consumption and don't reduce the net worth of the household through a discount of its cash, the disposal of its other financial or non-financial assets or a rise in its liabilities. Household income includes : (i) income from different works (both paid (direct wages and salaries for time worked and work done cash bonuses and gratuities, commissions and tips, directors‟ fee , profit-sharing bonuses and other forms of profit related pay and self-employment); (ii) property income(such as : Interest, Dividends and Rents etc.) (iii) Income from the production of goods and services that are produced for own consumption; and (IV) current transfers received (ILO, 2004)

3.5 Data Sources, Data Collection Techniques and hypotheses testing

In conducting this study primary data has been employed. Questionnaires were used to held face to face interview to women aged between (15-49) in the study area. To collect primary data on individual reproductive age women (15-49), the questionnaire which includes closed ended and open ended types and that consisted of three main sections has been prepared. The first part is personal characteristics of the women at present that helps to secure information about the personal profile of the respondents including their age, sex, marital status, and educational

attainment. The second section deals with income of the target group. Income from Salary, rent, and interest, divided and other source of income by asking different questions that can help in obtaining information's about the past and present income of the women. Questionnaire are prepared and administered for 422 women residing in the study area.

Data was collected by research assistants employed for this purpose. The data collectors were recruited based on their previous experiences that they have in conducting surveys, and communicating respondents. Two data collectors were recruited and trained by the researcher on sampling procedures, inclusion and exclusion criteria, data gathering, and management of the fieldwork.

3.5.1 Pre-Test

Pretest of the questionnaire was carried out in Wereda 8 of Addis Ketema Sub-City, which have similar socio demographic characteristics with the people of Addis ketema. During the pretest, the items that frequently a rise questions were revised and become clear. Both the interviewers and supervisors assessed clarity, understandability and completeness of the questions. Pre-test was done with 20 reproductive age women.

3.5.2 Statistical Tools

After data collection, the responses were coded and entered in to the computer and computing using SPSS version 23. Cleaned data set was prepared for the analysis. Tabulation plan was done and frequency distribution of dependent and independent variables was worked out. From these some of the useful and related variables were selected based on the study aims and hypothesis. Descriptive statistics and Poisson regression model was adapted to some of the selected independent variables which link with selected dependent variable.

3.5.3 Hypotheses of the Study

The hypotheses that have been set by the researcher for this study are the following:

i. Household income and children ever born are positively associated among women of reproductive age (15-49)
ii. Household income and children ever born are negatively associated among women of different age group (15-49)

iii. The mean CEB across different age group of reproductive age women with different house hold income level of women have no significant difference in central Addis Ababa of Addis Ketema Sub-City Wereda 4 and 10.

iv. The mean CEB across different age group of reproductive age women with different occupation of women have no significant difference in central Addis Ababa of Addis Ketema Sub-City Wereda 4 and 10.

3.7 Method of Data Analysis

The quantitative data was analyzed using descriptive and inferential statistics including percentages, graphs and model fitting. Data were collected through the close ended questions, and the analysis was done using statistical techniques that are found in the Statistical Package for Social Sciences (SPSS) software. As this paper explores the effect of household income on fertility, in a causal manner using primary data from the study location, it has employed the descriptive statistics and Poisson regression model, Poisson Count Variables with relatively low means, such as the number of own children per woman, frequently exhibit distributions that approximate Poisson distributions (Long 1997). A Poisson regression model was adopted to estimate the association between household income and fertility. More formally, the Poisson regression model assumes that the n observations yi are drawn from independent Poisson variables Yi with mean μi. On the basis of the observed characteristics, μ can be estimated as:

μij=exp ($xij\beta$+vj)

Where μij is the number of children for woman i living in Addis Ketema ,

xij is a vector of k characteristics of the woman ij,

the vector β contains the k parameters of the individual covariates, and v

j denotes wereda-specific fixed effects.

The Poisson regression model controls for wereda level-level unobserved heterogeneity. As a comparison, it estimates negative binomial models that are robust against over dispersion in the data (see Cameron and Trivedi 2009). They yielded practically identical results in terms of both the estimates and the p-values. The aim was to control for a number of possible explanatory

variables and spatial heterogeneity in estimating the association. The study also presents the model results that report the incidence rate ratio or EX (β), which expresses the relative change in the number of children for a unit change in the explanatory variable, holding all the other variables constant. The model, in general, analyzes the mean number of children ever born and other independent variables using Poisson regression model used to assess the association between children ever born and house hold income. The descriptive statistics, on the other hand, helped to gave the uni- variate and bi-variate analytical results of the study.

3.8 Ethical Considerations

The research progress has considered an ethical issue in all stages of the study. Ethical approval of the research proposal was obtained from the Center for Population Studies of the College of Development Studies, Addis Ababa University. Formal letter of the research approval was sent to the concerned administration offices to conduct the study. Allof the women included the study were provided with adequate information on the objectives of the study and anticipated results by the data collectors. Verbal consent was obtained from study participants for protecting autonomy and ensuring confidentiality. Respondents were also told that they have the right not to respond to any of the questions if they don't want to respond.

CHAPTER FOUR

4.1 RESULTS AND THE STUDY

4.1.1 Characteristics of the Study Population

This study assesses the relationship between household income and fertility in central Addis Ababa, Addis Ketema Sub-City Wereda 4, and 10 using primary data that was collected using structured survey questionnaires and face-to-face interview. It is based on data collected from a sample of 422 respondents. In this chapter, findings of the study are presented using descriptive statistics, and results of the Poisson regression model.

table4.1 1: Demographic and socio- economic characteristics of the respondents

Characteristics	Frequency	Percent	Mean CEB
Marital status			
Never married	86	20.4	0.47
Currently married	302	71.6	2.28
Divorced	34	8.1	1.47
Total	422	100.0	
Religion			
Orthodox	222	52.6	1.75
Protestant	16	3.8	1.38
Muslim	182	43.1	2.18
Catholic	2	.5	1
Total	422	100.0	

Age group			
15-19	12	2.8	0.17
20-24	40	9.5	0.8
25-29	94	22.3	1.22
30-34	92	21.8	2.07
35-39	90	21.3	2.42
40-44	60	14.2	2.27
45-49	34	8.1	2.53
Total	422	100.0	
Highest level of education			
No school	38	9.0	2.53
Primary school	122	31.3	1.74
Secondary school	174	41.2	2.01
Technical	20	4.7	1.7
Diploma	20	4.7	2
University Degree	38	9.0	.79
Total	422	100.0	
Employment status			
Working	212	50.2	1.46
Currently not working	210	49.8	2.23
Total	422	100.0	
Income group			
3000-25000	84	19.9	1.52
25001-45000	98	23.2	1.89
45001-80000	100	23.7	2.00
80001-150000	98	23.2	1.88
More than 150000	42	10.0	1.75
Total	422	100.0	

Sources: Author's household survey, 2021

As shown in Table 4.1 .1, a total of 422 women of reproductive age were participated in the study. Out of them, more than half (66.4 percent) of the respondents are between (25-45). From the total respondents, 86 (20.4 percent) never married, 302 (71.6 percent), married and 34 (8.1 percent) were divorced. Large proportions of the respondents (i.e., 52.6 percent) were Orthodox Christians, 43.1 percent are Muslim, and Protestant account for 3.8 percent and Catholic constitute only 0.5 percent. The majorities of respondents (41.2%) were attended secondary education and followed by primary education (31.3%) of the respondents. In addition 4.7% had completed technical and Diploma College and 9% only attended tertiary level education. With regard to their occupational status (49.8 %) women in the reproductive age are not participating in any income generating activities whereas, majority (50.2%) of the respondents are engaged in work sector at the time of the survey.

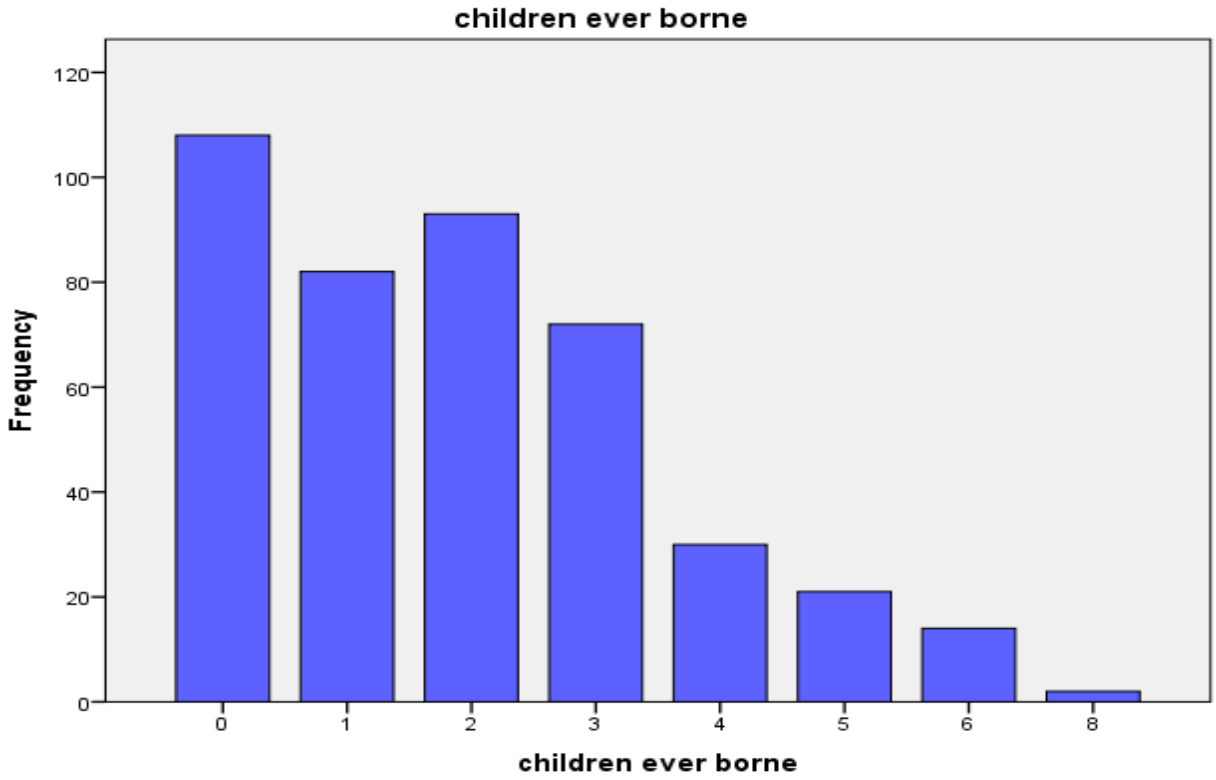
4 1.2 The Relationship between Income and Fertility

Table 4.1 shows values of average CEB women on the basis of income and socio demographic characteristics. According to the result of the survey, the mean CEB for women earning middle income have highest fertility which is 2.00 when we compare with other income group. The mean CEB for the higher income earner (more than 150000) and lower income earner (3000-25000 per year) was 1.75 and 1.52 respectively which is below replacement level. According to marital status, married women shows highest mean CEB (2.28) when we compare with never married and divorced women which was 0.47 and 1.47 respectively. On the other hand, the result shows that mean CEB of women with no education and university degree is the highest (2.53) and lowest (0.79), respectively. In relation to women age group, mean CEB increases as age increases except for women in the (40-44) age groups. Here, the result shows that older women have more children than young women, and there is slight difference in mean CEB among different age group in ascending order

4.1.2.1 Bivariate analysis of income and fertility relationship

To show the effect of household income on fertility, the Poisson regression model is fitted for women who responded to the survey. Because the mean and the standard deviation are very close results (1.7 and 1.9) respectively, and the CEB has skewed graph. We can show the graph of CEB as flows.

Fig3 1children ever borne



Source: Author's household survey, 2021

In addition to the above reason the kaike's Information Criterion (AIC) and Bayesian Information Criterion (BIC) of Poisson distribution was less than that of Negative binomial distribution which indicates that Poisson regression was best fitted model for the data than negative binomial regression. On the other hand, the goodness of fit test for the result shows that deviance of> 1 which indicates the presence of over dispersion but very close to one in the data which is resulted from zero inflation this indicates Poisson regression is best fitted.

Table 4.3 1: Bivariate Analysis of children ever born using Poisson regression

Parameter	B	Std. Error	Hypothesis Test		Exp(B)
			Df	Sig.	
(Intercept)	.463	.1361	1	.453	1.552
Never Married	-1.253	.2101	1	.006	.286
Married	.401	.1411	1	.001	1.493
Divorced	0[a]	.	.	.	1
Orthodox	.55	.7089	1	.431	1.748
Protestant	-.311	.7385		.666	1.375
Muslim	.425	.7089	1	.271	2.181
Catholic	0[a]	.	.	.	1
Age Group1(15-19)	2.787	.7148	1	.116	.313
Age Group1(20-24)	1.388	.2189	1	.000	.390
Age Group1(25-29)	.702	.1371	1	.000	.564
Age Group1(30-34)	.229	.1262	1	.111	.804
Age Group1(35-39)	.084	.1238	1	.222	.850
Age Group1(40-44)	.148	.1342	1	.036	.740
Age Group1(45-49)	0[a]	.	.	.	1
Not educated	.407	.2161	1	.059	1.503
Primary education	.305	.1999	1	.127	1.357
Secondary education	.287	.1918	1	.135	1.332
Technic	.606	.2573	1	.019	1.832
Diploma	.842	.2503	1	.001	2.320
Degree and above	0[a]	.	.	.	1
Age at first Birth	.023	.0049	1	.000	1.023
Occupation	.248	.0567	1	.000	1.281
Yearly income	-0.0189	0.00563	1	.008	0.953
(Scale)	1[b]				

Source: Author's household survey, 2021

Different researchers use different p value cut off points e.g. $p<0.25$, 0.2, and others include some variables without such restriction if authors believe the variables are significant (Cooke, Steven , 2019). As we can observe from the above table 4.3, the entire variable have P value of less than 0.2 except for Religion, as a result we can exclude the religion as a variable in the multiple regression analysis but, all variable included in following analysis.

4.1.2.2 Multi-variate analysis of income and fertility relationship

Table 4.4 1: Multivariate Analysis of children ever born using Poisson regression for differences in CEB in Central Addis Ababa, Addis Ketema, Werda Four and Werda 10

Parameter Estimates

Parameter	B	Std. Error	Hypothesis Test		Exp(B)
			Df	Sig.	
(Intercept)	-.595	.7934	1	.453	.552
Never Married	-.643	.2331	1	.006	.526
Married	.488	.1524	1	.001	1.628
Divorced	0[a]	.	.	.	1
Age Group1(15-19)	1.160	.7391	1	.116	.313
Age Group1(20-24)	.941	.2406	1	.000	.390
Age Group1(25-29)	.573	.1485	1	.000	.564
Age Group1(30-34)	.219	.1373	1	.111	.804
Age Group1(35-39)	.163	.1332	1	.222	.850
Age Group1(40-44)	.301	.1437	1	.036	.740
Age Group1(45-49)	0[a]	.	.	.	1
Not educated	.407	.2161	1	.059	1.503
Primary education	.305	.1999	1	.127	1.357
Secondary education	.287	.1918	1	.135	1.332
Technic	.606	.2573	1	.019	1.832
Diploma	.842	.2503	1	.001	2.320
Degree and above	0[a]	.	.	.	1
Age at first Birth	.023	.0049	1	.000	1.023
Occupation	.189	.0646	1	.003	1.208
Yearly income	-0.019	0.005	1	.027	0.935
(Scale)	1[b]				

Source: Author's household survey, 2021

The Likelihood Ratio Chi-Square (i.e. omnibus test) for the Poisson regression model shows a p value of < 0.001 which shows all predictor variables used in the Poisson regression model are meaningful predictors of the effects of mean CEB. As we can see from the above table 4.4 , Household Yearly income was significant predictor on the mean CEB (b= -0.019 S.E=0.005 Sig =.027) and the incidence rate ratio (found in EX (B) column) is 0.935 which indicates that household income was negative and significant determinant for the incident rate of CEB. The incidence rate ratio shows that for every one unit increase on the predictor, the predicted incidence rate changes by a factor of 0.935(meaning the incidence rate was decreasing)

The effect of marital status shows that as one moves from divorced women to married the expected mean number of children ever born increases by 0.48 and as we move to never married women CEB decrease by 0.643. Age of women is one of the most important biological and demographic determinants of fertility. In this study elder woman has a greater number of children as compared to her counterpart. When we compare those in their older reproductive years (i.e., 44-49 age groups) or taking this age as reference to the other age group shows that CEB decreases as we move from the higher group to the lower group, CEB is low among the younger age group (15-19) but high among 35-39 age group.

Women in the 15-19 age groups had the lowest number of children ever born when compared to women in the 45-49 age groups. Women in the 15-19, 30-34and 35-39 age groups have 0.313, 0.804 and 0.85 fewer children respectively than women in the 45-49 age groups. The difference was, however, not statistically significant among those with 15-19, 35-39and 30-34 age group (Table 4.4). On the other hand, a result in (Table4.4) shows that education status, and ages at first birth and occupation have significantly affected CEB of a woman. By Taking those women with university degree as a reference , women who had primary, secondary shows coefficient of a positive values but not statistically significant determinant of the incidence of mean CEB , whereas , technical and diploma level education have coefficient of a positive value and significant determinant for the incidence of mean CEB.

4.4 Discussion

This is a house hold based cross sectional study that attempted to assess the relationship between house hold income and fertility at central Addis Ababa, Addis Ketema Sub-City Wereda 4, and 10, Ethiopia. Based on this study, the mean CEB for women of reproductive age in the study area is 1.92 births, which is blow replacement level. This finding was comparable with the study done in Addis Ababa in which the mean CEB where 1.44 at Addis Ababa level and 1.62 at Addis Ketema sub city (PHC, 2007) and 1.9 at Addis Ababa according to (Gurmu and Mace, 2013). However, high number of finding was reported by Ethiopian DHS at national level which was 2.84 mean CEB (EDHS, 2016). Considerable differences in CEB exists according to women's age, educational status, religion, household income, occupational status, marital status age at first birth and level of income group. The effect of marital status on mean CEB shows that as one move from divorced women to married the expected mean number of children ever born increases by 0.628. However, as we move to never married women CEB decrease by 0.526. In terms of religion, this study examine that Muslim women were more likely to have more children than were to Orthodox, Protestant and Catholic women.

Based on Multivariate Analysis of children ever born using Poisson regression model, taking this age (44-49 age groups) as reference to the other age group shows that the age group of (20-24) ,(25-29) and (40-44) are significant determinant of CEB. Women in the 15-19, 30-34and 35-39 age groups have 0.313, 0.804 and 0.85 fewer children respectively than women in the 45-49 age groups. The difference was, however, not statistically significant among those with 15-19, 35-34and 35-39 age group (Table 4.4) which is in line with a study conducted in Addis Ababa by (Zewdie, 2020). Additionally, the study showed in (Table4.4) women, educational status, and ages at first birth and occupation affect significantly CEB of a woman.

In most cases, fertility is negatively associated with education (Shapiro et al, 2003). Women with no and primary and education have higher fertility than women with secondary and above education based on (EDH, 2000, 2005 and 2011). As table (4.2) of this study shows that women with higher education have lower fertility than women with no and primary education which is 2.53 for no education and 0.7 for university degree. This is in line with study conducted in Ghana, which showed higher education levels are consistently associated with lower fertility rates (Rutaremwa G 2015) and Study done in Sub-Saharan Africa identified level of education

as influencing factor of fertility (ohnson K, Abderrahim N, Rutstein , 2011). In addition, In Ethiopia, main differences were observed across educational status (Getu, 209, Mekonnen W, Worku A, 2011, EDHS, 2014, Bezaw, 2018)

The mean CEB for women who have work is less than women who have no work (i.e. 1.46 and 2.23) respectively as we can see in table 4.2. This indicates that women's work and fertility have an inverse relation. This result is in line with a study conduct at global level evidence that women's employment increased, and fertility decreased, in all four major world regions (Behrman, 2020) , and (Alemayehu, T, 2010, Haq, I., et al. and Eze, B.U., 2019), in which working women is associated with lower fertility rates.

This study shows that there is negative relationship between household income and fertility, and this is in agreement with other studies, a Study conducted in South Africa documented that there was negative relationship between income and fertility which was an income elasticity of demand for children of -0.31 (Dust, 2005) and (Schultz2005, Dao, 2017, Chisadzay and Bittencourtz, 2016, Klu¨sener and Myrskyla, 2018). In addition, the number of children from poor households was higher than children from rich households (Shewayiref , 2020). In this study, In the Multivariate Analysis of children ever born using Poisson regression model The Likelihood Ratio Chi-Square (i.e. omnibus test) for the Poisson regression model shows a p value of < 0.001 which shows all predictor variables used in the Poisson regression model are meaningful predictors of the effects of mean CEB. Household yearly income was significant predictor on the mean CEB (b= -0.019 S.E=0.005 sig =0.027 , CI =95%) and the incidence rate ratio (found in EX (B) column) is 0.935 which show s that household income was negative and significant determinant for the incident rate of CEB. The incidence rate ratio shows that for every one unit increase on the predictor, the predicted incidence rate changes by a factor of 0.935 (meaning the incidence rate was decreasing). Furthermore, as show in table 4.2 of this study, there is significance difference among the different income group. The lowest and highest income earners of the respondent have low fertility which is 1.52 and 1.75 respectively which is similar to (Dribe, Oris, & Pozzi, 2014; Livi-Bacci, 1986) , whereas the medium income earners have 2.0 children. This is might be because of The poor living in Addis Ababa have developed a general understanding of investing in fewer children in order to get them a better education and

enable them to compete in the saturated labour market of the city as (Gurmu and Mace, 2013) studded in Addis Ababa.

CHAPTER FIVE

SUMMARY CONCLUSION AND RECOMMENDATION

5.1 Summary

Based on the descriptive statistics of the study, majority of the respondents (71.6%) were currently married women whereas (20.4%) are never married women. The educational status shows that 91% among the respondent have attend school. Those reproductive age women that have achieved diploma and above are 13.3 %. In addition Large proportions of the respondents (i.e., 52.6 percent) were Orthodox Christians, while Muslims were (43.1%), and Protestant account for (3.8 %) but, (Catholic constitute only 0.5 %). With regard to their occupational status (49.8 %) women in the reproductive age are not working currently whereas, majority (50.2%) of the respondents are currently working at different sector during the time of the survey.

The mean CEB for study area is 1.92. There is slight difference in mean CEB among different age group in ascending order. Mean CEB increases as age increases with the except for women in the age group of (40-44). Here, the result shows that older women have more children than young women. The study shows that income distribution of households show a difference in the expected mean CEB among reproductive age women of the study area. Majority of women are

Concentrated in middle income categories .Those reproductive age women with lowest (3000-25000, low (25001-4500 0), medium (45001-80000), higher (80001-150000) and highest income earner (more than 150000) Ethiopian Birr have expected mean CEB of 1.52, 1.89, 2.00, 1.88 and 1.75 respectively.

The Poisson regression model shows that, marital status was significantly associated with CEB. The expected mean CEB of married women was 0.48 times high as compared to Divorced women. Similarly, the of The expected mean CEB of never married women was 0.643 times less likely as compared to Divorced women. The result also showed that women age group and mother's education level were significantly associated factor of CEB. Women age group of (20-24), (25-29) and (40-44) had about 0.941 ,0.573 and 0.301 time lower respectively as compared to the women in the age group (45-49). In addition, women who had technical education were 0 .606 and 0.842 times respectively higher expected mean CEB than women who have University degree. Moreover, household income was significant factor of CEB. The Likelihood Ratio Chi-

Square (i.e. omnibus test) for the Poisson regression model shows a p value of < 0.001 which shows all predictor variables used in the Poisson regression model are meaningful predictors of the effects of mean CEB. Household monthly income was significant predictor on the mean CEB (b= -0. 009 S.E=0. 005 Sig =.007) and the incidence rate ratio (found in EX (B) column) is 0.935 which indicates that household income was negative and significant determinant for the incident rate of CEB. The incidence rate ratio shows that for every one unit rise on the independent variable, the dependent variable incidence rate changes by a factor of 0.935 (meaning the incidence rate was decreasing).

5.2 Conclusion

Using primary data conducted in central Addis Ababa, Addis Ketema Sub-City Wereda 4, and 10, this study examines the interrelation between household income and CEB in the capital city. Results of the study have shown that there is a negative relationship between household income and children ever born, and there is a statistically significant difference in the expected mean CEB among women of different age groups. The mean CEB of non-working women in reproductive age is also higher than women who are engaged in some kind of economic activities. Analyses using bivariate and multivariate procedures have produced results that support the following observations and conclusions. From the total sample, most of the respondents are non-migrants. Comparison among different reproductive women age group the expected mean CEB increases with increase in age group. The lower age group of women (15-19) has a lowest mean number of children ever born whereas women age group of (40-44) has the highest expected mean CEB. Here, older women reproductive age group has higher expected mean CEB than young women reproductive age group. The finding indicates that household yearly income is significant determinant of CEB. The incidence rate ratio shows that for every one unit increase on the independent variable , the dependent incidence rate changes by a factor of 0.935(meaning the incidence rate was decreasing) On the other hand the education status, marital status, occupation and age at first birth have significantly affect CEB while, religion have no significant effect on CEB. The finding indicates that if there is negative relationship between household income and fertility this shows that as income increases fertility increases and vise-verse. As result the policy makers and planners better to consider this when they plan to change the fertility of the study area of this research.

5.3 Recommendation

Results of the study shows that household incomes have the capability of determining the CEB in Addis Ababa. A negative relationship is also observed between house hold income and CEB. Household income is significant determinant of CEB. Furthermore, the effect of household income on CEB of the study area differs among the five quartile -income groups. The results show that the lower income earner and higher income earner have lower expected mean CEB than medium income earner. Accordingly, the difference in the house hold income earning among the reproductive age women of the research area may have greater impact in population size and structure. Depending on the result of the study, it is possible to suggest that there should be focus on macroeconomic programs (like improving the living standard) of the society and reducing the living cost of the society. In addition, the population policy maker better to review fertility policy of Addis Ababa due to low CEB at the City level. Result of the study could also contribute to the literature on relationship between house hold income and fertility as efforts are made to test the main theoretical perspectives by providing empirical evidences that predict the outcome of differences in household income on the fertility level of women residing in the household. Furthermore, the study is not without limitations and these should be kept in mind when these results are interpreted. As members of our society do not have the culture of documenting their income and expenditure, it is very difficult to gather information on household income. As Expenditures are not addressed in this study, future research should consider it to examine the effect of household income from expenditure perspective and extend this strand of the research.

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APPENDIX THREE

INTRODUCTION AND CONSENT

QUESTIONS AND FILTERS CODING CATEGORIES SKIP

Hello. My name is _____. I am a graduate Student of Addis Ababa University. We are conducting a survey about household income and Fertility. The information we collect will help the government to plan health services and economic policies. Your household was selected for the survey. The questions may take about 20 min. All of the answers you give will be confidential and will not be shared with anyone other than members of our survey team. You don't have to be in the survey, but we hope you will agree to answer the questions since your views are important. If I ask you any question you don't want to answer, just let me know and I will go on to the next question or you can stop the interview at any time.

In case you need more information about the survey, you may contact the person listed on the card that has already been given to your household.

Do you have any questions?

May I begin the interview now?

Name of the women ---------- wereda ----------ketena ----------

MARITAL STATUS

a. Never Married 3. Separated
b. Married 4. Divorced

What is your religion?

1. Orthodox 3. Muslim
2. Protestant 4. Others

Section I: Characteristics of household

. How long have you been living continuously in Addis Ababa?	1. Greater than one year 2. Always 3. Less than one year
. How old were you at your last birthday?	Age in complete year…….
. Age at first marriage for those who are married, separated and divorced	Age in complete year…….
. Have you ever attended school?	1. YES 2. NO , if no skip to Q 6
. What is the highest level of school you attended? Primary, secondary, technical/vocational or higher?	1. PRIMARY 2. SECONDARY 3. TECHNICAL/VOCATIONAL 4. Diploma 5. Degree and more
. **SECTION II. REPRODUCTION**	

. Now I would like to ask about any children you have had during your life. I am interested in all of the children that are biologically yours, even if they are not legally yours or do Have you ever been mother any children with any men ?	
. Do you have any sons or daughters that you have mother who are now livings with you?	1. YES 2. NO , if no skip to Q 14
. How many sons live with you? And how many daughters live with you? IF NONE, RECORD '00'.	1. YES 2. NO
. Do you have any sons or daughters that you have mothered who are alive but do not live with you?	SONS AND DAUTORS AT HOME . . . . .
0. How many sons and daughters are alive but do not live with you? IF NONE, RECORD '00'.	1. YES . . . . 2. NO . . . . .
	SONS AND DAUGHTERS ELSEWHERE . . . .
1. Have you ever mothered a son or a daughter who was born alive but later died?	

2. How many boys have died? And How many girls have died? IF NONE, RECORD '00'. SUM ANSWERS TO 8, 10,12	1. YES . . . . 2. NO , if no skip to Q 13
3. How old were you when your first child was born?	BOYS AND GIRLS DEAD . . . .
Section III: Economic status of Respondents	TOTAL CHILDREN……..
4. Occupation	AGE IN YEARS . . . . .
5. If your working is your answer in which of the following you are occupied?	1) working 2) not working
6. Is the house is made-up of modern building materials 7. Is the house always drink highland water 8. Dose the house mad-up of	1. Government employed 2. Self employed 3. Private company employed 4. Daily worker 1. Yes 2. No 1. Yes 2. No

	1. Cement and bricker
Section IV: Cash income and receipts received by the household and type of tenure	2. Mud and cement 3. Wood and plastic material
List of receipts	
19. Net income from household agricultural enterprise	
20. Net income from household non-agri. enterprise	**Amount in birr per month**
21. Net income from wages and salaries/ pension allowance, bonus, part time, etc./	----------
22. Net income from rent/ house, machinery, animals, etc. /	----------
23. Sale from free collection(fire wood, mining ,……etc)	
24. Gift and/or obtained free from government	----------
25. Gift and/or obtained free from other than government	----------
26. Gift and/or obtained free from abroad	----------
27. Gift and/or obtained free from households with in Ethiopia	----------
28. Pension and other social benefits received	----------
29. Sale of household fixed assets and personal goods	----------
30. Receipts from insurance	----------
31. Receipts from winning	
32. Receipts from Ekub	----------

33. Receipts from Edir 34. Deposit. etc 35. Divided / Share profit 36. Other income than listed above SUM OF ALL RECIEPTS	---------- ---------- ---------- ---------- ---------- ---------- ---------- ----------

Income from household agricultural enterprise = 1	Sale of household fixed assets and personal goods = 11
Income from household non-agri. enterprise = 2	Receipts from insurance = 12
Income from wages and salaries/ pension allowance, bonus, part time, etc./ = 3	Receipts from winning =13
	Receipts from Ekub = 14
Income from rent/ house, machinery, animals, etc. / = 4	Receipts from Edir= 15
Sale from free collection(fire wood, mining ,……etc) =5	Deposit. etc = 16
Gift and/or obtained free from government = 6	Divided / Share profit = 17
Gift and/or obtained free from other than government = 7	Other income than listed above = 18
Gift and/or obtained free from abroad = 8	
Gift and/or obtained free from households with in Ethiopia = 9	
Pension and other social benefits received= 10	

Appendix:1 Poisson distribution

Goodness of Fit[a]

	Value	df	Value/df
Deviance	388.379	383	1.014
Scaled Deviance	388.379	383	
Pearson Chi-Square	390.460	383	1.019
Scaled Pearson Chi-Square	390.460	383	
Log Likelihood[b]	-619.065		
Akaike's Information Criterion (AIC)	1270.131		
Finite Sample Corrected AIC (AICC)	1271.555		
Bayesian Information Criterion (BIC)	1333.954		
Consistent AIC (CAIC)	1349.954		

Dependent Variable: children ever borne

Model: (Intercept), mrts, religion, agegr, occp, ageafb, totalYD

a. Information criteria are in smaller-is-better form.

b. The full log likelihood function is displayed and used in computing information criteria.

APpendix2: negative binomial distribution

Goodness of Fit[a]

	Value	df	Value/df
Deviance	168.087	383	.439
Scaled Deviance	168.087	383	
Pearson Chi-Square	163.158	383	.426
Scaled Pearson Chi-Square	163.158	383	
Log Likelihood[b]	-713.426		
Akaike's Information Criterion (AIC)	1458.852		
Finite Sample Corrected AIC (AICC)	1460.276		
Bayesian Information Criterion (BIC)	1522.676		
Consistent AIC (CAIC)	1538.676		

Dependent Variable: children ever borne

Model: (Intercept), mrts, agegr, occp, ageafb, totalYD

a. Information criteria are in smaller-is-better form.

b. The full log likelihood function is displayed and used in computing information criteria.